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EPA's (Environmental Protection Agency's) Approach to Pollution Prevention

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The EPA's Approach to Pollution Prevention

Environmental protection and industrial productivity are not mutually exclusive. Waste minimization (or elimination) is a goal we all can live with.

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"Knock, knock."
"Who's there?"
"It's the EPA and we're here to help you."

This often-heard anecdotal conversation is viewed with more than a little skepticism by many chemical engineers, but in the area of pollution prevention, it is literally true. The recent focus on pollution prevention as the "first choice option" for environmental protection by the Environmental Protection Agency (EPA) is very real, *and* it involves a true, cooperative, nonadversarial approach by the agency—perhaps a first for the EPA in its 18-year history.

While strong regulations are absolutely essential to protecting the quality of our environment, it has become apparent to the Congress that even strongly enforced end-of-pipe and top-of-stack discharge requirements and vigorously regulated hazardous waste disposal alone will not solve all of the environmental problems in the United States. In fact, the new national policy declared in the Hazardous and Solid Waste Amendments of 1984 stated that "wherever feasible, the generation of hazardous waste is to be reduced or eliminated as expeditiously as possible." Furthermore, the act specifically directed the EPA to report to the Congress on the feasibility and desirability of developing mandatory requirements to *compel* the adoption of pollution-prevention techniques.

In its 1986 Report to Congress, the EPA described its exploration of various technical, economic, and policy issues relevant to the reduction and recycling of hazardous and nonhazardous wastes and concluded that aggressive action in favor of waste minimization is clearly needed. But, it rejected the need for specific mandatory standards for waste reduction, at least initially. This was based on three key factors. First, mandatory programs would second-guess industry's production decisions and, quite possibly, produce counterproductive results. Second, they would be difficult and expensive to design and administer. Third, generators are already facing strong economic incentives to reduce their wastes. Moreover, a regulatory program would take time to develop, and many industries might postpone *any* action until mandatory requirements were defined. The agency is, however, currently examining the use of pollution-prevention incentives and audits to assess whether satisfactory progress is being made.

The report stressed that the most constructive role government could assume would be one that promoted voluntary waste minimization by providing information, technology transfer, and assistance to waste generators. The agency then proposed a pollution-prevention program to encourage industry to accelerate efforts to reduce the generation of wastes by implementing process changes and/or the incorporation of recycling methods.

EPA's approach

In its efforts to pursue the objectives set forth by Con-

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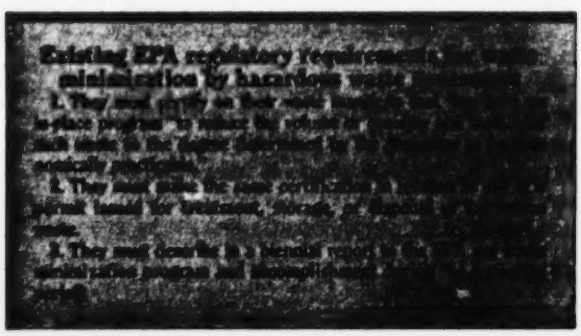
gress, in 1988 the EPA created a new Pollution Prevention Office (PPO) within its Office of Policy Planning and Evaluation and established a Waste Minimization Branch in its Risk Reduction Engineering Laboratory in Cincinnati, OH. A directive was also issued by the EPA administrator stating that the reduction of waste at the source will, henceforth, stand at the top of the hierarchy of waste management options *for all EPA programs.*

The EPA's hierarchy of waste management options is as follows:

1. *source reduction:* reducing the amount of wastes at the source through changes in the processes that generate them;
2. *recycling:* reusing and recycling wastes as substitutes for feedstocks/ingredients for industrial processes;
3. *treatment:* destroying, detoxifying, or neutralizing wastes (including separation, volume reduction, or energy recovery);
4. *disposal:* discharging wastes into ambient water or air or injecting or depositing wastes into or onto the land.

All emissions, releases, and wastes—not just hazardous wastes. While the concepts of waste minimization are, in fact, very old (keep in mind that "wastes" have always been unwanted, troublesome, and costly to deal with), it is only recently that the concept of waste minimization as the cornerstone of a national pollution-control strategy has come to prominence even in the technical community. To a large extent, this has resulted from the increasing stringency of EPA and state regulations on hazardous wastes (including the so-called "landfill ban") and from the rapidly increasing costs associated with hazardous waste destruction and disposal. Within the EPA the focus previously had been primarily on waste minimization as a *hazardous waste* control practice, but more and more attention should and will be given to waste minimization as a tool for protecting against air and water pollution as well as for dealing with other environmental threats such as chlorofluorocarbons, radon and other indoor air pollutants, nonhazardous solid wastes, medical wastes, and even the greenhouse effect.

Recognizing this broader application, the EPA has adopted the term *pollution prevention* to replace waste minimization. The basic and simple principles of pollution prevention can and should be applied beyond just production processes: environmental gain can be achieved by applying pollution prevention to packaging, distribution, and consumption as well.



A partnership is needed. Interestingly, because of its history, the EPA has found itself relatively unequipped to undertake its new program in pollution prevention because its programs traditionally have dealt with pollutants (how to detect and measure them, what their effects are, and how to control them); in the pollution-prevention area, however, the EPA needs individuals who can understand and deal, not with pollutants themselves, but with how, why, and where pollutants—especially industrial pollutants—are created. Hence, assistance from and a partnership with many groups and individuals outside of the agency are required. Such involvement by chemists and chemical engineers is especially critical because of the predominating role these two professions play in the selection, design, and operation of the processes that create most of the highly hazardous pollutants.

To foster cooperation with the states, the EPA is working closely with the National Roundtable of State Waste Reduction Programs, an alliance of state organizations dedicated (in whole or in part) to assisting industrial firms in incorporating pollution-prevention techniques into their operations. The organization promotes communication and coordination among state organizations and provides input and guidance to the EPA with regard to the EPA's pollution-prevention efforts.

Getting the word out. The specific audiences and their messages vary, but the underlying theme the EPA wishes convey is the same: *we, as a society, must begin to integrate pollution prevention into the way we design, build, buy, and consume.* The EPA sends this message using a variety of tools.

Perhaps the most visible element of the EPA's efforts on this subject is its Pollution Prevention Information Clearinghouse (PPIC). This national clearinghouse is being pilot tested this year and will be fully operational in 1990. PPIC will collect and disseminate technical and other information on pollution prevention through a telephone hotline and an electronic information-exchange network. Indexed bibliographies and abstracts of reports, publications, and case studies on pollution prevention will be available, as will a calendar of pertinent conferences and seminars, information on federal and state activities and legislation, information on pollution prevention abroad, a directory of waste exchanges, and lists of knowledgeable contacts within state organizations, trade associations, and the EPA. The clearinghouse will make copies of various reports available either by electronic transfer or through the National Technical Information Service or other sources.

The EPA is also publishing a newsletter containing information on technologies, regulatory changes, grant information, and other items of interest; in addition, it is developing a media campaign on pollution prevention that will include radio and television public service announcements, posters, brochures, and so on.

Pollution Prevention Office

The EPA's new Pollution Prevention Office helps coordinate pollution-prevention activities across all EPA head-

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quarters and regional offices. A pollution-prevention advisory committee, composed of senior agency managers and created at the same time as the new office, assists in assuring that the coordination is effective. The objective of the Pollution Prevention Office is to insure that the agency, the states, industry, and society in general incorporate pollution prevention into their regulatory programs, their manufacturing activities, and their very attitudes. This is no small agenda, but the stakes are high and the opportunities for gains are substantial. Some activities the office will pursue to bring these changes about are outlined below.

Integrating pollution prevention into EPA programs. The Pollution Prevention Office is working with the advisory committee and all other EPA offices both to promote a cross-media perspective and to integrate pollution prevention into the fabric of all EPA programs. Four approaches are being used.

First, the agency published a Pollution Prevention Policy Statement in the January 26, 1989 Federal Register that articulates the EPA's hierarchy for waste and emission management and commits the agency to a primary emphasis on pollution prevention.

Second, the PPO is working with the other agency offices to coordinate a review of existing statutes, regulations, guidances, and policies. The aim of this effort is to examine each EPA program in order to determine 1) where prevention opportunities exist and 2) whether the programs encourage, are neutral to, or impede pollution prevention (and to substitute programmatic and regulatory incentives in their place where appropriate). Each of the agency's offices are developing plans and objectives to carry out this review and assure that future regulations and statutes conform with EPA's Pollution Prevention Policy and the national policy articulated by Congress in the 1984 RCRA amendments.

Third, the agency is examining a number of initiatives, including increased regulatory flexibility and various financial incentives, that may ultimately form the basis for statutory provisions specifically addressing pollution prevention.

Finally, the PPO, in conjunction with the EPA's Office of Research and Development, Office of Solid Waste, and Office of Federal Activities, is working to assure that the federal government's own house is in order. Specifically, the EPA is seeking to assure that the federal procurement process and product specifications are geared toward fostering products and processes that incorporate pollution prevention whenever possible. The EPA also seeks to assure that all departments and agencies that generate pollutants adopt pollution-prevention policies.

Supporting regional, state, and local programs. The Pollution Prevention Office has a number of activities that are designed to foster the development of new state and local programs and to strengthen and support programs that already exist. Chief among these are the new pollution-prevention pilot programs in 7 of the 10 EPA Regional Offices and the support of state multimedia grants for waste minimization.

The pilot multimedia pollution-prevention programs are now underway in EPA regions I, III, IV, VI, VIII, IX, and X. The activities in these regions include a broad range of projects aimed at fostering pollution prevention at the regional, state, and local levels as well as specific industry initiatives. The remaining EPA regions are also working to integrate pollution prevention into all of their programs.

Similarly, the PPO awarded grants totaling nearly $4 million to 13 states and a multistate consortium early in 1989. A second round of grants totaling $3 million will be awarded in the fall of 1989. These grants will support the development of multimedia pollution-prevention programs through which the states can work directly with the private sector, local governments, and other constituencies to prevent pollution.

Evaluating progress and targeting opportunities. The goal of this activity is to develop reliable indicators of pollution prevention and to develop and implement a data collection strategy that will establish a baseline, measure progress, and allow the agency to determine where progress is being made and where opportunities for more substantial progress exist but are not being realized.

The EPA is aware of the burdens imposed on industry by the data requirements currently in place. For this reason the strategy being developed will rely, to the maximum extent possible, on existing agency databases. Essentially, the EPA will review existing databases to identify data gaps and develop the means for filling those gaps.

As now envisioned, the EPA will work primarily with the Toxics Release Inventory (TRI), which was mandated by Section 313 of SARA. This database has the advantage of being multimedia in scope. Ultimately, some combination of a census, briefly covering source reduction information (such as Section 8 of the TRI reporting form), and a more in-depth survey used in conjunction with other program databases could satisfy agency information needs in this area. The exact scope and nature of data collection activities supporting pollution prevention may be shaped by legislation—currently, several bills containing data collection requirements as well as other pollution-prevention initiatives are being considered by Congress.

Building consensus. A primary goal of the Pollution Prevention Office is to build a consensus in the public on the goals and objectives of pollution prevention. The PPO and the agency will seek to achieve what has been called a "cultural change" or a "paradigm shift" at all levels of gov-

ernment and industry as well as among the public and the international community. Regardless of the name, pollution prevention requires some fundamental changes in the way products are designed and produced, in how they are marketed, and in the choices made by consumers, regulators, and corporations.

Industry. Within industry, environmental engineers and chemical or process engineers must be encouraged to communicate and to seek solutions to environmental problems through product design, raw material changes, and process modifications before resorting to end-of-pipe solutions. Financial officers must devise accounting mechanisms that allow the true cost of waste treatment and disposal to be applied against a specific product or process, including the costs associated with long-term liability and adverse public relations. Senior corporate executives must make a strong public commitment to pollution prevention because experience has shown that substantial progress follows corporate commitment from the top down. Industry must be convinced that pollution prevention offers a framework that allows us all to enhance competitiveness, conserve resources, and, at the same time, achieve substantial progress in environmental protection.

Government. The regulators and legislators at both the state and federal levels must realize that in order to achieve the promise offered by pollution prevention, a stable yet flexible regulatory framework must be provided—only with the assurance of continuity will industry commit the funds and effort needed to implement pollution prevention. Decision makers at all levels of government must understand that environmental programs based on pollution prevention can offer substantial savings on administrative costs while reducing risks and improving environmental results. Wastes that are not generated and releases that do not occur do not require expensive reporting, inspection, monitoring, and other compliance and enforcement activity.

Environmental and public interest groups. Environmental and public interest groups will have to view regulatory changes not as a retreat from an effective environmental program, but as a means of achieving long-term, permanent environmental gains—often as the only means available for problems that have proved intractable to command and control programs. Both environmentalists and industry must replace the confrontational policies of the past with an alliance based on the certain knowledge that environmental progress and industrial productivity are not mutually exclusive goals. Environmentalists and public interest groups must be convinced to educate the public and lawmakers so that informed choices can be made and their consequences can be understood.

Consumers and the general public. As members of the general public, we must learn that we are a part of the environmental problem and that we must also be a part of the solution. We can no longer drink from styrofoam cups, live in air-conditioned homes, drive air-conditioned, low-milage cars, and, at the same time, decry ozone depletion and global warming as if they are not interconnected matters. We must be aware that the choices we make as consumers have environmental consequences. We must learn that we can directly affect the amount of waste our society generates—the amount of CFCs, CO_2 and SO_x that foul the atmosphere and acidify our rain, the tons of solid wastes that choke our cities and our landfills, the volume of pesticides and other toxic compounds that poison our lands, pollute our lakes and rivers, and lay waste our wetlands. All of these wastes are generated by the demands of the consuming public—and *we* are the consuming public.

The international community. The international community must understand that the world is indeed a global village: pollutants neither recognize nor respect international boundaries. If the problems are international in scope, the solutions must be as well. If the challenges posed by acid rain, global warming, and stratospheric ozone depletion are to be met and solved, countries must work together and profoundly reduce the amounts of pollutants released into the biosphere. The EPA must assume a leadership role and build on the growing international awareness of pollution prevention as the best framework for reversing the seemingly inevitable upward trend in worldwide pollution levels.

Waste Minimization Branch

At the EPA's Risk Reduction Engineering Laboratory in Cincinnati, the Waste Minimization Branch provides technical and research support to the agency's Pollution Prevention Program. The branch's activities may best be described in terms of the programs for which it is responsible.

Waste Reduction Innovative Technology Evaluation (WRITE) program. The purpose of the WRITE program is to identify, evaluate, and promote the use of new ideas and technologies for waste reduction by developing reliable cost and performance information on these methods. It involves the cooperative efforts of the EPA, the states, and private industry in the development and/or demonstration of effective technologies for pollution prevention. The WRITE program is broad in technical scope, and it addresses the reduction of pollutants across all environmental media: air, land, surface water, and groundwater. Source reduction techniques are particularly emphasized.

The WRITE program is comprised of both evaluation and research activities. For evaluations, under the "WRITE Program with State/Local Governments," cooperative agree-

As a society, we must integrate pollution prevention into the way we design, build, buy, and consume.

ments are being developed with appropriate state or local government agencies. EPA funds are transferred to these agencies on a matching basis, and the agencies use them to identify immediate pollution-prevention information-transfer opportunities and to enlist the cooperation of small- to mid-sized businesses that have ongoing or planned pollution-prevention efforts that they are willing to have evaluated. This joint effort with state and local governments receives the bulk of WRITE program funding because state and local governments are normally quite familiar with local industrial practices and regional manufacturing and economic interests, factors that can greatly affect the potential success and broad applicability of proposed pollution-prevention methods.

The state agencies currently involved in the WRITE program are the California Department of Health Services, the Connecticut Hazardous Waste Management Service, the Illinois Hazardous Waste Research and Information Center, the Minnesota Technical Assistance Program (MnTAP), the New Jersey Department of Environmental Protection, and the Washington Department of Ecology.

The second part of the evaluation activity, the "WRITE Program with Industry," involves direct EPA cooperation with private industrial firms or trade associations. This activity focuses on evaluating waste reduction techniques currently in use or being developed by larger industries. One of the objectives of this program is to encourage the transfer of knowledge and technology concerning pollution-prevention practices between large firms and their mid- to small-sized counterparts. Under the "WRITE Program with Industry," on-site evaluations of waste reduction techniques, funded jointly by the EPA and the company or trade association involved, are performed.

The "WRITE Research Program" focuses on meeting various pollution-prevention research needs, such as generating the data necessary to allow the demonstration and evaluation of emerging pollution-prevention techniques. Projects under this portion of the WRITE program address various technical barriers to waste reduction and various chemical-, waste-stream-, or industry-specific waste minimization obstacles. Research projects are funded with industrial firms, universities, other government agencies, technical societies, and industrial trade organizations.

Waste Reduction Evaluations at Federal Sites (WREAFS) program. The WREAFS program consists of a series of demonstration and evaluation projects on waste reduction conducted cooperatively by the EPA and various parts of the Department of Defense (DOD), the Department of Energy, and other federal agencies.

Many federal agencies have undertaken waste minimization plans and programs during the past few years. For example, an overall goal within the DOD is the reduction of hazardous waste generation by a total of 50% (compared with 1985 levels) by 1992. Hence, a variety of opportunities already exist for productive evaluations, and the results should be applicable not only elsewhere in government but also in the private sector. Many manufacturing and other operations conducted by the government are often identical to (or very closely related to) activities in private industry. The applications may vary depending on the final product, but the same pollution-prevention techniques and technologies should work in both the federal and the private sectors. The WREAFS program can involve any federal agency and any unclassified process.

Waste Reduction Assessments Program (WRAP). WRAP is aimed at encouraging the industrial use of waste minimization assessments, *i.e.*, the structured identification and assessment of options for reducing waste generation within a plant or within a process. These assessments may be conducted internally by an in-house team or may be carried out with outside assistance in addition to in-house support. Normally, a preliminary assessment will be followed by a more detailed analysis of selected options to confirm and compare the projected cost effectiveness of candidate techniques.

The major output of WRAP has been the EPA's "Manual for Waste Minimization Opportunity Assessments." Over 2,000 copies of this manual have been distributed to date; many were reproduced and issued by various state and other organizations. The manual describes step-by-step procedures to systematically identify methods of reducing or eliminating waste generation in a broad array of industrial settings. The standard procedures, which are applicable to many sizes and types of businesses, provide a uniform framework for those in decision-making roles involving the implementation, postponement, or rejection of identified options. As experience is gained with the assessment protocol, it is hoped that the effectiveness of translating incentives and disincentives for waste minimization into quantifiable factors that can be ranked objectively will be confirmed.

Present and future efforts within WRAP involve the development of a series of industry- and process-specific manuals to be used in conducting the more detailed, second-level analyses mentioned previously.

Waste Reduction Institute for Scientists and Engineers (WRISE). The EPA and the Univ. of Cincinnati established WRISE to provide a new liaison channel between researchers in the field of pollution prevention and potential implementors of new and improved pollution-prevention techniques. This new channel is important because of the unique nature of the EPA's pollution-prevention program and because the EPA's ultimate clientele for this research are, to a large part, individuals in industry with whom the

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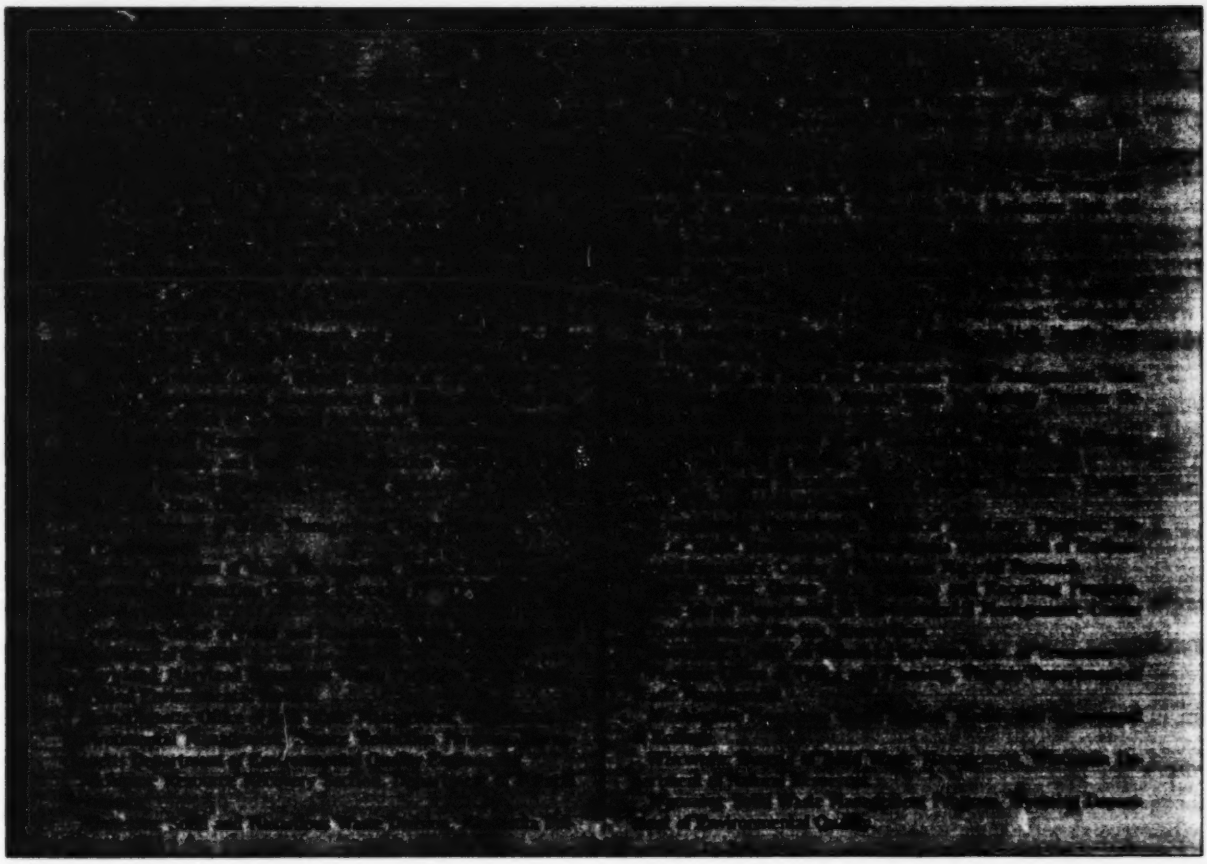

EPA traditionally has not directly dealt (*i.e.*, those concerned with the processes that *generate* pollutants as opposed to those concerned with the treatment and disposal of wastes).

Some 30 to 40 professional societies and trade organizations (including the AIChE) were invited to submit nominees for membership in WRISE and 20 individuals have been selected as initial institute members; each possesses credentials of accomplishment in pollution prevention, has a continuing interest in environmental protection, and is (or has been) responsible for plant management or process design/selection or is highly knowledgeable of industrial operations for which waste reduction techniques are applicable.

WRISE will select its own chairperson from among its members while its executive secretary will be provided by the Univ. of Cincinnati. Institute members are currently envisioned as volunteers who are interested in public service and are willing to participate on an expenses-reimbursed basis. Functions of the WRISE—*e.g.*, analyzing possible cross-generator applications of successful waste minimization techniques, commenting on the practicality and applicability of novel pollution-prevention techniques, assisting in obtaining the cooperation of potential hosts for waste minimization demonstrations, and encouraging and assisting universities in introducing and emphasizing waste minimization concepts in their plant and process design curricula —will be accomplished during one or two annual meetings in addition to a variety of voluntary individual assignments.

The future

Congress's Fiscal Year 1989 Appropriations Act for the EPA included a requirement that "a multi-year plan addressing the critical research elements to support an Agencywide multi-media pollution prevention initiative should be submitted [to the Congress]." The multiyear plan was submitted in May, 1989 and is based (to a substantial degree) on the recommendations included in last year's EPA Science Advisory Board (SAB) report, "Future Risk: Research Strategies for the 1990s." The SAB report concluded that "the Agency must develop a strategy that emphasizes the reduction of pollution before it is generated." It is apparent, therefore, that the cooperative "knock, knock" from the EPA is going to be heard more and more often in times to come. ■

Recommended reading

"Report to Congress: Waste Minimization," Vols. I and II, EPA/530-SW-86-033 and -034, U.S. Environmental Protection Agency, Washington, DC (Oct. 1986).

"Serious Reduction of Hazardous Waste. For Pollution Prevention and Industrial Efficiency," Office of Technology Assessment, OTA-ITE-317, U.S. Government Printing Office, Washington, DC (Sept. 1986).

"Waste Minimization Opportunity Assessment Manual," EPA/625/7-88/003, National Technical Information Service, Springfield, VA (July 1988).

"Waste Minimization: Environmental Quality with Economic Benefits," EPA/530-SW-87-026, U.S. Environmental Protection Agency, Washington, DC (Oct. 1987).

"Report to Congress: Pollution Prevention Research Plan," U.S. Environmental Protection Agency, Washington, DC (May 1989).

"Future Risk: Research Strategies for the 1990s," SAB-EC-88-040, U.S. Environmental Protection Agency, Washington, DC (Sept. 1988).